

WE CLAIM:

1. A catalyst system comprising:
  - (a) one or more bisarylimino pyridine iron or cobalt catalysts;
  - (b) a first co-catalyst compound which is selected from aluminium alkyls, aluminoxanes, and mixtures thereof; and
  - (c) a second co-catalyst compound which comprises one or more compounds of the formula  $ZnR'_2$  wherein each  $R'$ , which may be the same or different, is selected from hydrogen, optionally substituted  $C_1$ - $C_{20}$  hydrocarbyl, phenyl, F, Cl, Br, I,  $SR''$ ,  $NR''_2$ , OH,  $OR''$ , CN, NC wherein  $R''$ , which within the same molecule may be the same or different, is  $C_1$ - $C_{20}$  hydrocarbyl.
2. The catalyst system of Claim 1 wherein  $R'$  is  $C_1$ - $C_{20}$  hydrocarbyl.
3. The catalyst system of Claim 2 wherein  $R'$  is  $C_1$ - $C_{20}$  alkyl.
4. The catalyst system of Claim 3 wherein  $R'$  is  $C_1$ - $C_6$  alkyl.
5. The catalyst system of Claim 4 wherein  $R'$  is ethyl.
6. The catalyst system of Claim 1 wherein the first co-catalyst is an aluminoxane selected from the group consisting of methyl aluminoxane, alkyl-modified methyl aluminoxane, and mixtures thereof.
7. The catalyst system of Claim 6 wherein the first co-catalyst is an isobutyl-modified methyl aluminoxane.
8. The catalyst system of Claim 1 wherein the molar ratio of the metal of the first co-catalyst to the metal

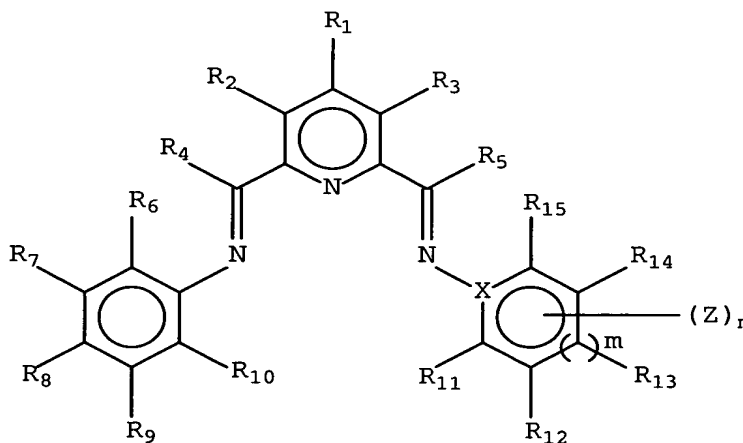
of the second co-catalyst is in the range of from about 5:1 to about 1:5.

9. The catalyst system of Claim 8 wherein molar ratio is from about 3:1 to about 1:3.

10. The catalyst system of Claim 9 wherein molar ratio is from about 2:1 to about 1:2.

11. The catalyst system of Claim 1 wherein the bisarylimino pyridine iron or cobalt catalyst is selected from the group consisting of bisaryliminepyridine  $\text{MX}_n$  complexes and/or  $[\text{bis-aryliminepyridine MY}_p\text{.L}_b^+][\text{NC}^-]_q$  complexes, said bis-aryliminepyridine complexes comprising a bisarylimine pyridine ligand, wherein M is a metal atom selected from the group consisting of Fe or Co, n is 2 or 3, and X is halide, optionally substituted hydrocarbyl, alkoxide, amide or hydride, Y is a ligand which may insert an olefin,  $\text{NC}^-$  is a non-coordinating anion, p+q is 2 or 3, matching the formal oxidation of said metal atom; L is a neutral Lewis donor molecule; b is 0, 1 or 2.

12. The catalyst system of Claim 11 wherein the bisarylimine pyridine ligand is selected from the group consisting of ligands having the formula (I) below:



(I)

wherein X is carbon or nitrogen,

n is 0 or 1,

m is 0 or 1,

Z is a  $\pi$ -coordinated metal fragment ,

R<sub>1</sub>-R<sub>5</sub>, R<sub>7</sub>-R<sub>9</sub> and R<sub>12</sub>-R<sub>14</sub> are each, independently, hydrogen, optionally substituted hydrocarbyl, an inert functional group, or any two of R<sub>1</sub>-R<sub>3</sub>, R<sub>7</sub>-R<sub>9</sub> and R<sub>12</sub>-R<sub>14</sub> vicinal to one another taken together may form a ring; R<sub>6</sub> is hydrogen, optionally substituted hydrocarbyl, an inert functional group, or taken together with R<sub>7</sub> or R<sub>4</sub> to form a ring; R<sub>10</sub> is hydrogen, optionally substituted hydrocarbyl, an inert functional group, or taken together with R<sub>9</sub> or R<sub>4</sub> to form a ring; R<sub>11</sub> is hydrogen, optionally substituted hydrocarbyl, an inert functional group, or taken together with R<sub>5</sub> or R<sub>12</sub> to form a ring; and R<sub>15</sub> is hydrogen, optionally substituted hydrocarbyl, an inert functional group, or taken together with R<sub>5</sub> or R<sub>14</sub> to form a ring.

13. A process for the production of alpha-olefins comprising reacting ethylene under oligomerisation conditions in the presence of an effective amount of the catalyst system of Claim 1.

14. The process of Claim 13 wherein the reaction temperature is from about -100°C to about 300°C.

15. The process of Claim 14 wherein the reaction temperature is from about 0°C to about 200°C.

16. The process of Claim 15 wherein the reaction temperature is from about 50°C to about 150°C.

17. The process of Claim 13 wherein the reaction pressure is from about 0.1 to about 15 mPa.

18. The process of Claim 17 wherein the reaction pressure is from about 1 to about 10 mPa.

19. The process of Claim 18 wherein the reaction pressure is from about 1.5 to about 5 mPa.
20. The process of claim 13 wherein the conditions are selected to produce a product slate having a K-factor of about 0.40 to about 0.90.
21. The process of claim 20 wherein the conditions are selected to produce a product slate having a K-factor of about 0.60 to about 0.80.